0.64 inches below the normal respectively. On the 29th, the centre of low area moved nearly parallel to the north Atlantic coast, where high northeasterly gales, with snow, prevailed. The storm was evidently very heavy at sea. Cautionary signals displayed on the Texas coast were justified by the following velocities: Indianola, 32 nw.; Galveston, 36 n. Cautionary signals were displayed in advance of this storm on the Atlantic coast on the 27th, from Jacksonville to Kittyhawk; on the 28th from Cape Henry to Provincetown; on the 29th from Boston to Eastport. The following are the maximum velocities reported: Savannah, 25 ne.; Charleston, 28 ne.; Smithville, 31 ne.; Macon, 48 n.; Hatteras, 38 nw.; Kittyhawk, 45 ne.; Cape Henry, 56 nw.; Chincoteague, 40 ne.; Delaware Breakwater, 45 ne.; Cape May, 40 nw.; Atlantic City, 30 ne.; Barnegat, 37 ne.; Sandy Hook, 39 ne.; Block Island, 26 ne.; Newport, 25 n.; Provincetown, 28 ne.; Eastport, 37 ne.

NORTH ATLANTIC STORMS DURING NOVEMBER, 1882.

On chart SUPPLEMENTAL TO i. will be found the tracks of the principal storms that have prevailed over the north Atlantic ocean during November, 1882. The tracings of the paths of the centres of barometric minima are based on reports of observations received from agents and captains of ocean steamships and sailing vessels in the north Atlantic during the month, and from other miscellaneous data on file at this office up to December 25th.

The observations used are, in general, simultaneous, being taken each day at 7h. 0m., a. m., Washington, or 12h. 8m., p. m., Greenwich mean time.

The following brief notes concern the storms above mentioned:

I.—On the 1st, an area of low-pressure occupied the ocean between N. 45° and 55°, and between W. 25° and 35°. The lowest reported pressure was observed in N. 50° 08′, W. 27° 13′; the s. s. "Scythia", reporting barometer 29.19 (741.4 mm.), wind w., force 7; rough sea and showery weather. By the morning of the 2d, the region of lowest pressure had apparently moved towards the British coasts; on that date, the s. s. "Celtic", in N. 51° 31′, W. 13° 52′, reported barometer 29.25 (742.9 mm.), wind w., force 8; squally and showery weather, with heavy sea. The barometer remained low near the British coasts, and strong westerly and southwesterly winds prevailed until the 4th.

II.—On the 2d, an area of low-pressure, probably subsidiary to low area i., appeared over mid-ocean, causing strong westerly gales and showery weather. On the 3d, the region of lowest pressure was near N. 54°, W. 28°. The s. s. "Anchoria," in N. 52° 58′, W. 28° 10′, reported barometer 29.30 (744.2 mm.), wind wsw., force 9; squally weather and heavy sea.

III.—On the 7th, a deep depression appeared near N. 55°, W. 20°. It apparently moved eastward, causing a decrease in pressure over that part of the ocean east of the fifteenth meridian. The s. s. "Bolivia," in N. 55° 02′, W. 19° 27′, reported barometer 28.85 (732.8 mm.), wind nw. force 8; rainy. On the 8th, the depression was probably near the northwestern coast of Ireland; the s. s. "Arizona," in N. 51° 27′ .W 14° 05′, reported barometer 29.32 (744.7 mm.), wind wsw. force 7; squally weather and lightning, and the s. s. "Stella," in N. 50° 59′, W. 14° 19,′ barometer 29.21 (741.9 mm.), wind wsw. force 9; squally.

IV.—A well-defined depression appeared on the 10th, with its centre to the westward of the Azores. The s. s. "Madrid," in N. 38° 54′, W. 25° 31′, reported barometer, 29.70 (754.4 mm), being a fall of .38 inch in twenty-four hours; wind s. to sw. force 6; very heavy rain. On the 11th, the disturbance moved eastward and was probably central northeast of the Azores; the s. s. "Madrid" reported as follows: 11th, in N. 39° 19′, W. 27° 16′, at 7 a. m. wind w. force 7, lasted till 4 p. m., lowest barometer reading 29.62 (752.1 mm.). At 6 p. m. the wind shifted to wnw. and nw. and gradually decreased in force, while the barometer began to rise. At the same day, the s. s. "Peconic," in N. 36° 35′, W. 18° 00′, had s. wind of force 7; barometer falling and weather threatening. On the 12th, the same vessel, in N. 36° 50′ W. 22° 00′, reported barometer 29.74 (755.4), wind w. force 6; long cross sea.

V.—The reports indicate that a disturbance was present on the 13th near N. 50°, and between W. 30° and 40°. The s. s. "Stella," in N. 50° 36′, W. 32° 40′, reported barometer 29.62 (752.3 mm.), wind nw., force 5, squally. On the 14th, the s. s. "Wyoming," in N. 51° 22′, W. 25° 11′, had moderate winds, increasing to strong w. and sw. gale, with head sea. On the 15th, the depression moved northeastward, and was central near N. 55°, W. 14°; on that date, the s. s. "Scandinavian," in N. 54° 40′, W. 16° 12′, reported: 1.17 a. m. (Greenwich mean time), wind shifted to nw., with showery weather; at 8.49 a. m., barometer 29.48 (748.8 mm.), oscillating till noon; at 0.50 p. m., wind unsteady in direction and force; squalls moderating, but coming in quick succession, with hail and rain, sea very confused. This storm was probably identical with that which prevailed on the British coasts on the 16th.

VI.—This is a continuation of the storm traced as low area iii. on chart i. for November. On the 23d, the disturbance was central near the entrance to the Gulf of Saint Lawrence. It apparently moved northeastward, and on the 24th, was shown near N. 50°, W. 50°; the s. s. "Polynesian," in N. 48° 39′, W. 47° 41′, reported barometer 29.16 (740.7 mm.), wind sw., force 5, overcast, rough sea. On the 25th, the storm-centre, having moved slowly eastward, was apparently near N. 50°, W. 40°. During the 26th and 27th, the disturbance appears to have moved very slowly and was central in mid-ocean; on the last-mentioned date, the depression disappeared; probably yielding to the influence of an area of high barometer that prevailed on the 27th, 28th, and 29th, over the Atlantic east of the thirtieth meridian.

VII.—This is a continuation of low area iv of chart i. The depression was central in the Gulf of Saint Lawrence on the 26th; it moved over Newfoundland and disappeared to the northeastward on the following day.

INTERNATIONAL METEOROLOGY.

International charts iv. and v. accompany the present number of this REVIEW. Chart iv. is published for September, 1880, and continues the series of that chart began in January, 1877. Chart v. is prepared for November, 1880, and continues the series of that chart began in November, 1877. For the description of these charts, much valuable information has been obtained from the "Monatliche Uebersicht der Witterung," published by Professor Dr. G. Neumayer, Director of the German Marine Observatory at Hamburg, and from the "Bulletin Mensuel," published by Mr. Marc Dechrevens, of Zi-Ka-Wei, China.

Chart iv. exhibits the mean pressure, mean temperature, and the prevailing direction of the wind over the northern hemisphere, and at certain isolated stations in the southern hemisphere, as determined from one observation taken each day at 7.35 a. m. Washington, or 0.43 p. m. Greenwich mean time.

Two areas of barometric minima are shown on the chart. The first area, enclosed by the isobar of 29.70 (754.4), occupies British India; the second area, 29.80 (756.9), covers the extreme northwestern part of Norway, and, extending westward, includes Iceland within its limits.

The isobar of 29.90 (759.4) occupies Norway, Scotland, the northwest of Ireland, and the northern part of British America.

In the United States, the area of highest pressures occupies the south Atlantic and Gulf states, and the southern parts of Tennessee and Virginia.

On the Pacific coast, the area of barometric maxima occupies Oregon and Washington territory, the highest monthly mean, 30.23 (767.8), being reported from Umatilla, Oregon.

Compared with the preceding month, (August, 1880), the mean atmospheric pressure, in the United States, has increased over the country lying between the Atlantic ocean and the ninetieth meridian, and between 30° and 40° north latitude. It has also increased slightly on the Pacific coast. In all other parts of the United States, the mean pressure has remained unchanged. In Canada, the mean pressure has decreased slightly.

In Europe, the pressure has decreased over the British Isles; the Scandinavian peninsula, and over Denmark. In all other

parts of the continent, including Russia, there has been an increase of pressure.

In Greenland, the pressure has increased; the mean for the month, at Godthaab, being 29.82 (757.4), or .24 inch above that of August.

In Morocco, Algeria, and Tunis, the pressure has increased .10 inch.

In Asia, a general increase of pressure is shown over the entire continent.

Compared with the corresponding month of previous years, the mean barometric pressure is slightly above the normal in the Carolinas, and in Georgia. In the New England states and in Minnesota and Dakota, the pressure is slightly below the normal, and in all other parts of the United States it is about normal.

In Canada, the mean pressure is slightly below the normal.

The following table shows the mean pressure and mean temperature, with corresponding departures, for the month of September, 1880, in the several countries of Europe and Asia, compared with the means as determined from observations taken during the years 1877, 1878, and 1879:

Countries.	Mean Pressure.			Mean Temperature.		
	Sept., 1877, 1878, and 1879.	Sept., 1880.	Departure.	Sept., 1877, 1878, and 1879.	Sept., 1880.	Departure.
				°	°	°
Algeria	30.01	30.08	+0.07	80.8	83.4	+2.6
Austria	29.96	30.01	+0.05	66.2	67.0	+0.8
British Isles	29.93	29.96	+0.02	58.6	53.0	+4.4
Denmark	29.89	29.95	+0.06	58.0	62.5	+4.5
France	30.02	30.05	+0.03	68.0	70.5	+2.5
Germany	30.00	30.03	+0.03	62.9	67.3	+4.4
India	29.69	29.71	+0.02	82.9	81.2	−1.7
Italy	29.96	30.03	+0.07	75.9	74.2	−1.7
Norway	29.76	29.86	+0.10	54.7	59.7	+5.0
Portugal	30.00	30.07	+0.07	73.5	78.7	+5.2
Russia	29.93	30.01	+0.08	61.8	63.8	+2.0
Spain	30.02*	30.06	+0.04	75.0*	76.9	+1.9
Sweden	29.79	29.96	+0.17	55.1	59.0	+3.9

* Mean for two years only.

The accompanying table shows the deviations in pressure and temperature at isolated stations during the month of August, 1880, as compared with the means of three years:

Comparative Thermometric and Barometric Means, with corresponding Departures.

STATION.	Mean Pressure.			Mean Temperature.		
	Sept., 1877-78-79.	Sept., 1880.	Departure.	Sept., 1877-78-79.	Sept., 1880.	Departure.
				°	°	°
San José, Costa Rica, C. A.				67.8	67.8	normal
Gibraltar	29.99	30.05	+0.06	*75.4	76.9	+1.5
Malta, Mediterranean Sea	29.93	30.00	+0.07	82.9	81.0	−1.9
Sandwick Manse, Orkney Islands	29.83	29.85	+0.02	53.5	56.8	+3.3
Bridgetown, Barbadoes	29.93	29.99	+0.06	83.1	80.9	−2.2
Cape Town, Cape Good Hope	30.14	30.10	−0.04	64.6	65.1	+0.5
Fort Napier, Natal, South Africa	*29.96	29.93	−0.03	*73.8	75.0	+1.2
Freetown, Sierra Leone	29.89	29.88	−0.01	81.7	83.2	+1.5
Mauritius, Indian Ocean	30.15	30.18	+0.03	73.3	72.2	−1.1
Melbourne, New South Wales	30.03	30.02	−0.01	52.7	52.6	−0.1
Nassau, Bahamas	29.97	30.01	+0.04	83.5	82.0	−1.5
Godthaab, Greenland	29.72	29.82	+0.10	38.0	39.0	+1.0
Stykkisholm, Iceland	29.60	29.68	+0.08	44.8	45.7	+0.9
Thorshavn, Faroe Islands	29.72	29.74	+0.02	60.5	63.8	+3.3
Fort-de-France, Martinique	29.89	30.17	+0.28	81.1	77.2	−3.9
Zi-Ka-Wei, China	29.93	29.99	+0.06	70.2	71.4	+1.2
Athens, Greece	29.95	29.98	+0.03	83.1	79.2	−3.9
Lahore, British India	29.63	29.64	+0.01	91.4	93.1	+1.7
Cagliari, Sardinia, Italy	29.94	29.97	+0.03	79.2	79.3	+0.1
Tokei, Japan	29.91	30.01	+0.10	69.7	73.4	+3.7
Tromsoe, Norway	29.62	29.79	+0.17	47.9	48.9	+1.0
Angra, Azores	30.18	30.18	normal	70.3	72.0	+1.7
Funchal, Madeira Islands	30.10	30.14	+0.04	75.7	76.6	+0.9
Ponta Delgado, Azores	30.20	30.17	−0.03	73.6	73.4	−0.2
Archangel, Russia	29.80	30.00	+0.20	49.6	55.4	+5.8
Tiflis, Russia	29.93	29.96	+0.03	76.4	73.4	−3.0
Astrakhan, Russia	30.01	30.04	+0.03	70.4	68.9	−1.5
Ekaterinburg, Russia	29.89	30.07	+0.18	52.2	57.9	+4.8
Nukuss, Toorkistan, Asia	29.98	30.02	+0.04	75.5	75.0	−0.5
Tashkend, Toorkistan, Asia	30.00	29.94	−0.06	68.9	70.3	+1.4
Barnaul, Siberia, Asia	29.89	30.03	+0.14	57.9	50.9	−7.0
Pekin, China	29.96	30.00	+0.04	68.2	65.5	−2.7
Nikolaievsk on the Amoor, Asia				49.6	50.7	+1.1
San Juan de Puerto Rico, W. I.	29.94	30.04	+0.10	81.3	82.0	+0.7
Beirut, Turkey in Asia	29.85	29.89	+0.04	85.1	83.8	−1.3
Havana, Cuba, W. I.	29.95	30.04	+0.09	81.8	80.1	−1.7
Paramaribo, D. Guiana, S. A.	30.06	29.98	−0.08	82.9	80.5	−2.4
York Factory, B. A.	29.92	29.99	+0.07	36.6	36.0	−0.6

* Means for two years only.

In the United States, north of the forty-third parallel of latitude, the temperature was normal, or slightly above; in Virginia, Maryland, Pennsylvania, and New York, the temperature was above the normal; in other sections of the country it was below the normal. In Canada, the mean temperature was slightly above the normal.

In Europe, the mean temperature of the air was everywhere above the normal, the greatest excesses occurring in the northern and northwestern part of the continent.

In British India, the temperature was slightly below the normal; the highest mean, 93°.1 Fahr. (33°.9 Cent.), was reported at Lahore, and the lowest, 68°.8 Fahr. (20°.4 Cent.), at Belgaum.

The following are some of the extreme monthly mean temperatures reported at isolated stations:

HIGHEST.	Degrees.	LOWEST.	Degrees.
	°		°
Beirut, Asia	83.8	York Factory, British America	36.0
Freetown, Africa	83.2	Godthaab, Greenland	39.0
Saint Thomas, West Indies	82.6	Yeniseisk, northwestern Siberia	40.6
Nassau, Bahamas	82.0	Nertchinsk, southeastern Siberia	44.6

In the United States, the prevailing directions of the wind were: east of the Mississippi river and north of the fortieth parallel, southerly; along the immediate Atlantic coast, northerly and northeasterly; in Georgia, Alabama, and Mississippi, northerly and northwesterly; in Texas, southerly and southeasterly.

In Canada, the winds were westerly and southwesterly.

In Europe, the prevailing directions of the wind were as follows: westerly and southwesterly in the British Isles, Denmark, and central Germany; southerly and southwesterly in France; in Russia, they were mostly southerly.

In Algeria, Morocco, and Tunis, the winds were variable.

In Asia, the prevailing directions were westerly and southwesterly; at Zi-Ka-Wei, China, it was easterly; at stations in the island of Niphon, the winds were southerly; at other stations in Japan, they were northerly and northeasterly.

Over the Atlantic ocean, the prevailing winds were: southwesterly off the coasts of the United States, in the Bay of Biscay, and off the British coasts; north of the forty-fifth parallel, they were northerly and northwesterly.

The rainfall of the month was above the average in Texas, Arkansas, Mississippi, Alabama, and Tennessee; it was about the average in the New England states and in the interior of the country, elsewhere it was below the average.

In Canada, the rainfall was everywhere above the average.

In central and northwestern Europe, the rainfall was generally above the average.

Chart v. exhibits the paths of barometric depressions which have been traced from the daily international charts for the month of December, 1880.

The data are charted for each day of the month, on the charts accompanying the "INTERNATIONAL BULLETIN" for that day, and from these charts and from additional reports, are traced the movements of the centres of barometric minima.

Thirty-six of the principal storms that have occurred over the northern hemisphere have thus been traced. The following concerns the general distribution of these depressions:

Sixteen appeared in the United States and Canada; five of which, after leaving the coast of North America, crossed the Atlantic ocean, and appeared in Europe. An unusually large number of depressions appeared on the Pacific coast; of these, four have been traced across the country to the Atlantic.

Fifteen areas of low barometer appeared in Europe; of these, thirteen traversed the northern and western parts of the continent, while two depressions,—numbers xxxiii. and xxiii.—appeared south of the forty-fifth parallel. North of the sixtieth parallel of latitude, the general direction of the storm-centres was from northwest to east-southeast, south of the above-mentioned latitude, the movement was towards the northeast or east-northeast.

Five depressions are traced in Asia; four of these appeared

in Japan, and one,—number xxxii.—occurred in Asiatic Turkey.

The following brief discriptions of the storms which first appeared in North America, are given:

I.—This depression was a continuation of low-area x. of the November chart. On the 1st, the disturbance was central near N. 51°, W. 42°; the s. s. "Germanic," in N. 48° 23′, W. 42° 50′, reporting barometer 29.60 (751.8), wind w., force 6, and the s. s. "Circassian," in N. 52°, W. 34°, encountered a strong s. gale, with hard squalls. On the 2d, the depression disappeared southeast of Greenland.

II.—This area was a continuation of the storm given as low-area xi. on the November chart. The depression was central near Lake Erie on the 1st; moving rapidly eastward, it passed into the Atlantic, and on the 2d, was central, with greatly decreased pressure, south of Newfoundland. On that day, the s. s. "Köln," in N. 41° 43′, W. 50° 44′, reported barometer 28.67 (728.2), wind wsw., force 4–5, heavy sea; ship "Nairnshire," in N. 41° 25′, W. 43° 29′, barometer 29.14 (740.1), wind sse., force 8, raining. On the 3d, a large area of low barometer occupied mid-ocean, the region of lowest pressure being near N. 50°, W. 40°; the s. s. "Illinois," in N. 49° 39′, W. 37° 20′, reported barometer 28.68 (728.5), wind sw., force 7, squally, while strong gales with rainy weather prevailed over the ocean between W. 60° and W. 30°. On the 4th, the depression, having moved very slowly in a northerly direction, was central near N. 55°, W. 35°, the s. s. "Republic," in N. 50°, W. 32°, reporting strong s. gale, veering to w., and the s. s. "France," in N. 47°, W. 37°, encountered hurricane-like winds from se., sw., and nw. On the 5th, the storm-centre was probably near N. 60°, W. 30°, and by the 6th, it had moved to the northward of Iceland, barometer at Stykkisholm reading 29.31 (744.8), wind sw., raining. On the 7th, the disturbance, moving in a northeasterly direction, was central at some distance off the coast of Norway. The subsequent course of this depression is given as low-area xix. of this chart.

III.—This disturbance was first observed off the coast of Oregon, where it prevailed as a somewhat severe storm for several days; the ship "Remijio," off Columbia river, reported heavy wsw. to nw. and sw. gales, from November 29th to December 3d. The storm-centre entered Oregon on the 2d, and caused strong gales along the California coast; on the 3d, the depression, having moved slowly east-southeastward, was central in Nevada, its passage being marked by heavy rains in that state and in California. By the morning of the 4th, the storm-centre was in Wyoming, whence it moved rapidly east-northeastward, and on the 5th, it appeared in northern Michigan, the pressure at Escanaba being 28.89 (733.8), or 1.13 inches below the normal. Owing to the presence of an area of high-pressure, 30.20 (767.1), which followed immediately in the rear of the depression, very high southwesterly and northwesterly winds prevailed on lakes Superior, Michigan, and Huron, where the maximum winds of the month occurred in connection with this area. On the 6th, the depression moved down the Saint Lawrence valley and was central near Father Point. During its passage, the barometric pressure had greatly increased and the storm lost much of its energy. It disappeared to the northward of the Gulf of Saint Lawrence on the 6th.

IV.—After the passage of low-area iii., the pressure decreased in North Carolina, and the circulation of the winds indicated the presence of a barometric disturbance near the coast. On the morning of the 7th, the disturbance appeared south of Nova Scotia as a well-defined area of low barometer. It moved northeastward and disappeared on the 8th to the northward of Newfoundland.

V.—This disturbance appeared in Nebraska on the morning of the 7th, and moved rapidly eastward to the lake region, where it was central near Georgian Bay on the 8th. Heavy snow-storms occurred in Ontario and in the state of New York during the passage of this area.

VI.—This storm developed near Bermuda, where a heavy nw. gale, with violent squalls, occurred on the 10th. On the 11th, the storm-centre was near N. 38°, W. 62°, the s. s. "Arizona," in N. 43°, W. 61°, reporting strong e. to ne. gale, while the nw. gale still continued at Bermuda. On the 12th, the disturbance was central south of Newfoundland, the pressure at Saint John's, Newfoundland, being 29.40 (746.7), wind se. On the 13th, the storm-centre moved in a northeasterly course to N. 51°, W. 45°, the s. s. "Celtic," in N. 47° 16′, W. 45° 42′, reporting barometer 29.46 (749.3), wind wsw., force 7; on the same day, the s. s. "Suevia," in N. 43°, W. 54°, encountered a heavy ssw. to w. gale, with high sea, and the bark "Von Berg," off the Banks, had a violent e. to ene. gale, with blinding snow-storm. On the 14th, the depression, following an east-northeasterly course, was central near N. 45°, W. 30°, the s. s. "City of Chester," in N. 49°, W. 38°, reporting strong sw. to wnw. gale. On the 15th, the disturbance was off the British coasts, and is hereafter described as low area xxii., of this chart.

VII.—This low area developed apparently in Manitoba, British America, on the 10th, and by the 11th, was central in Minnesota. It moved, by a course slightly south of east, towards Lake Michigan, where it was central on the morning of the 12th. On the 13th, the centre of disturbance was in Ontario, where the lowest reported pressure was 29.44 (747.8), at Parry Sound. During the 13th, the storm moved northeastward over the Maritime Provinces, and disappeared on the 14th, in the Gulf of Saint Lawrence. No high winds occurred in connection with this depression, but it was attended by rain and snow in all the districts through which it passed.

VIII.—This disturbance developed in the Saskatchewan valley on the 12th, and, moving southeastward during the day, was central in Minnesota on the 13th. The depression continued its southeasterly movement, and by the morning of the 14th, was central over Lake Michigan; the course then changed to the east-northeastward, and the disturbance moved, with decreasing pressure at the centre, down the Saint Lawrence valley to the gulf, where it was central on the 16th. During the 17th, 18th, and 19th, the barometer remained low over the New England states and the Canadian Maritime Provinces, and the centre appears to have remained nearly stationary on those days, but on the 20th, it resumed its northeasterly movement and appeared near N. 50°, W. 40°. On that date, the s. s. "Pennsylvania," in N. 49° 23′, W. 35° 33′, reported barometer 29.23 (742.4), wind s., force 5. During the 20th, this disturbance probably united with low area x., and is subsequently described in connection with that depression.

IX.—This depression, which was of slight importance, appeared in Indian Territory on the 15th, and was probably an off-shoot of low area x., in which it merged on the following day.

X.—This disturbance developed over the Pacific ocean, and was central off the coast of British Columbia on the 14th, on which date heavy southwest gales occurred over Puget sound. The storm-centre moved in a southeasterly direction, and on the 15th, was central in Washington Territory, where the lowest reported pressure was 29.16 (740.7), or 1.02 inches below the normal, at Olympia. On the 16th, the disturbance was in western Colorado, with increased pressure at the centre; the course then changed to east-southeasterly, and the depression moved rapidly across the country and passed off the North Carolina coast into the Atlantic, on the 18th. Moving northeastward, at some distance from the coast, this area, having united with the remains of low area viii., formed an extensive and deep depression south of Newfoundland. The disturbance remained nearly stationary during the 20th and 21st; on the latter date, the pressure decreased .50 inch, the s. s. "Pennsylvania," in N. 48° 08′, W. 40° 22′, reporting barometer 28.96 (735.6), wind s., force 5. On the 22d, the storm-centre was near N. 53°, W. 30°; the s. s. "Ethiopia," in N. 51° 01′, W. 38° 43′, reported barometer 29.00 (736.6), wind n., force 5, and the s. s. "Westphalia," in N. 49°, W. 27°, encountered a wsw. gale with heavy sea. On the 23d, the depression was central off

the coast of Scotland. This disturbance is hereafter described as low area xxix. of this REVIEW.

XI.—This storm developed in the Pacific ocean, and was first observed on the 15th by the ship "Ella" when about five hundred miles west of the Farallone islands. On that day, the vessel encountered strong sw. gale, with very heavy sea and squally weather, barometer falling to 29.95 (760.7); on the evening of the 15th, the wind shifted to wnw. and blew in strong gusts until the morning of the 16th, when it moderated. On the 17th, the wind increased in force from the se.; at 10.00 p. m. it began to lull, and veered to e., ne., n., and finally to nw., accompanied by very heavy sea. The lowest observed pressure was 29.55 (750.6), on the 17th. On the 15th, the ship "Fresno," in N. 35° 00′, W. 126° 30′, had strong nw. wind, and on the 17th, when off the Farallones, she encountered se. veering to ne. gales, in which she lost several sails. On the morning on the 18th, the depression was central in California, where it filled up during the day. Strong gales prevailed along the Californian coast during the presence of this disturbance.

XII.—This depression developed over the Gulf of Mexico on the 18th, and moved northeastward to northern Florida, where it was central on the 19th. On the morning of the 20th, the storm was central off the coast of North Carolina, the bark "Omega," in N. 35° 21′, W. 74° 15′, encountering a strong ene. gale, which lasted twenty-four hours. On the 21st, the depression, following the trend of the coast, was central off the New England coast; very severe northeasterly gales and heavy snow-falls occurred along the middle Atlantic coast during the passage of the disturbance. During the 21st, the barometric pressure decreased rapidly, and the storm-centre moved in an easterly direction over the Atlantic; on the 22d, it was near N. 40°, W. 55°, attended by strong southwest to northwest gales. On the 23d, the centre was in N. 45°, W. 42°; the lowest barometer, 29.20 (741.7) being reported by the s. s. "Illinois," in N. 44° 28,′ W. 44° 25′. On the 24th, the depression presented an elliptical form, and extended in a northeasterly direction from N. 38° to N. 52°, and from W. 52° to W. 35°. During the 25th and 26th, the storm-centre moved toward the British coasts, and on the last-mentioned date was near N. 50°, W. 20°. A decrease of pressure set in over the British Isles on the 26th, and the winds shifted to south and southeast. This area is hereafter designated as low area xxx.

XIII.—This depression appeared off the Pacific coast on the 22d, the s. s. "Belgic," in N. 38° 01′, W. 124° 54′, reporting barometer 29.73 (755.1), wind s., force 5, raining. During the 23d and 24th, the centre passed rapidly southeastward, and was in Georgia on the morning of the 25th; the pressure decreased rapidly during the day, and the disturbance moved northeastward to the coast of North Carolina, where it was central on the 26th. The storm-centre then moved northeastward very near to the coast, and in a line parallel to it; on the 28th, it passed over Cape Breton Island, causing heavy snow in the Maritime Provinces, and finally disappeared north of Newfoundland. During its passage along the Atlantic coast, this storm exhibited great energy, causing very heavy ne. to nw. gales, with rain and heavy snowfalls.

XIV.—This depression moved southeastward from Manitoba, crossed Lake Superior, and on the 27th was central in Ontario. During the day, it moved eastward over the Maritime Provinces, and merged, on the 28th, with the preceding depression, low area xiii.

XV.—This disturbance appeared off the coast of Oregon on the 27th. The centre pursued a southeasterly course, and, on the morning of the 28th, was in western Texas, whence it moved over the Gulf of Mexico; the course then changed to northeasterly, and the centre crossed northern Florida on the 29th. The centre of disturbance then moved northeastward nearly parallel with the coast, its track being similar to, but farther to the eastward than, that of low area xiii. On the night of the 29th, the depression passed as a severe storm over the Canadian Maritime Provinces, and on the 30th it was central over the Gulf of Saint Lawrence. By the 31st, it had moved north-northeastward, and was probably merged in a deep depression which appeared over Greenland at the close of the month.

XVI.—This depression moved from the northwest territories of British America, in a southeasterly direction, toward Lake Superior, near which it was central on the 29th. It passed over Canada, and united with low-area xv., over the Gulf of Saint Lawrence, on the 30th.

The following descriptions concern the storms that occurred in Europe during December, 1880.

XVII.—This depression appeared off the southwestern coast of Norway, on the morning of the 1st, causing rainy weather over the southern part of the Scandinavian peninsula and over Scotland. During the 1st, the depression moved eastward and on the morning of the 2d, it was central near the eastern shores of the Baltic. Strong southwesterly winds prevailed over the Baltic sea, and rain fell at stations in advance of the centre; after the passage of the disturbance, the pressure increased rapidly over Scandinavia and the British Isles, and was accompanied by a considerable fall in temperature. On the 3d, the depression, continuing its easterly movement, was central near Moscow, and on the 4th, it probably merged in an extensive area of low-pressure, which, on that date, occupied northeastern and central Russia.

XVIII.—An area of low, but slowly increasing pressure occupied northeastern and central Russia, and western Siberia from the 1st to the 5th. During its prevalence, the temperature fluctuated irregularly in the districts above-named, until the 6th, when a fall became general, and an area of high-pressure began to spread over European Russia and western Asia.

XIX.—This is a continuation of the storm traced from the American continent, as low-area ii. On the morning of the 8th, the disturbance was central off the northern coast of Norway; rain fell at stations in Scandinavia and over the northern part of Scotland, and a rise in temperature occurred over the same districts. On the 9th, the region of lowest pressure remained in northern Scandinavia, while a decided barometric fall took place over Russia and over western Siberia, on that day.

XX.—This depression appeared to the westward of Greenland on the 9th. On that date, the barometer at Godthaab read 29.08 (736.6), being a fall of .52 inch in twenty-four hours. The centre moved over the southern extremity of Greenland, where it was central on the following day. On the 11th, the storm-centre passed eastward, south of Iceland, and was near the Faroe islands, causing a decided fall in pressure, with strong westerly and southwesterly winds and rain over the northern part of the British Isles. By the morning of the 12th, the disturbance was central in southern Scandinavia, the lowest reported pressure being 28.92 (734.6), at Stockholm. Strong westerly winds prevailed at stations in the southern quadrants, and cloudy weather with rain or snow, was general throughout central and northern Europe. On the 12th, the storm-centre moved by a southeasterly course over the Baltic and entered Russia. Very heavy southwest to northwest storms occurred in northern Germany during the passage of this depression; the river Elbe rose ten feet above its normal level, and caused much damage to vessels and other property. At Kiel, in the duchy of Holstein; Glückstadt, Hanover; and at Hamburg, houses were unroofed and chimneys blown down, and a large number of trees were uprooted. On the morning of the 13th, the centre of disturbance was near Vilna, in the province of West Russia, at which station, the barometer read 29.19 (741.5). On the 13th and 14th, a trough of low-pressure extended from the Baltic provinces, eastward to central Russia. By the morning of the 15th, the storm-centre, having moved southeastward, was near Lugan, South Russia, barometer 29.12 (739.6), wind wsw. During the day, the disturbance probably moved northeastward, and disappeared in the vicinity of the Ural mountains. Under the influence of this depression, strong westerly winds occurred over the Black sea.

XXI.—This depression appeared near the Norwegian coast on the 11th, and probably developed from the remains of low area xx. It pursued a southeasterly course; crossed the Baltic, and was central in the Baltic provinces of Russia on the 11th. It apparently filled up on the 12th, in eastern Russia.

XXII.—This is a continuation of the storm described as low area vi. On the morning of the 15th, the disturbance was central off the west coast of Ireland; it passed eastward over the British Isles and the North sea during the day, and on the 16th, was central in northern Germany. It moved rapidly eastward, with increasing pressure at the centre, and disappeared in eastern Russia on the 17th.

XXIII.—This depression appeared in northern Italy on the 15th. It crossed the Adriatic sea and disappeared in Austro-Hungary on the 16th. This disturbance was very slight, the pressure at no time falling below 29.80 (756.9).

XXIV.—This depression appeared in northern France on the 17th, and was attended by rain and by a slight rise in temperature over that district and over the southern part of England and the channel. On the 16th, the disturbance moved northeastward into Germany, where it ceased to exist as a depression.

XXV.—This disturbance, enclosed by the isobar of 29.20 (741.7), was central on the morning of the 17th in the extreme northern part of Scandinavia. It moved in a course slightly south of east, toward the White sea, where it was central on the 18th. The course then changed to northeasterly, and the depression disappeared on the 19th, east of Archangel.

XXVI.—During the night of the 17th–18th, a very sudden and marked change occurred in the distribution of pressure over the British Isles. On the morning of the 18th, a deep depression, enclosed by the isobar of 28.80 (731.5), appeared north of Ireland, causing a barometric fall of .75 to 1.00 inch over the British Isles, the North sea, and over the western part of Germany. Rain fell in Ireland and in the northwestern part of Scotland, and the temperature rose several degrees as the depression moved eastward. By the morning of the 19th, the centre of disturbance, which appeared to move slowly, was over the northern part of the North sea, with the pressure gradually decreasing as the disturbance moved eastward. Strong westerly and southwesterly gales prevailed at nearly all stations in Ireland and Scotland, and at scattering stations in England. Comparatively high-pressures, 29.80 (756.9), occupied Scandinavia and northern France, where the winds were easterly and southwesterly, respectively. The pressure rose rapidly over the British Isles, after the passage of the disturbance, while a slight decrease set in over northern France, and generally heavy rains occurred over that section. By the morning of the 20th, low area xxvi had moved, by a a course slightly north of east, to southern Scandinavia. The temperature rose several degrees and snow fell in that region during the day, while fresh to strong westerly and southwesterly winds were reported from Denmark and Germany. On the 21st, the storm moved over the Baltic by a southeast course and disappeared in the Baltic provinces on the same day.

XXVII.—On the 20th, a decrease of pressure set in over northern France; the disturbance moved in a southeasterly direction, and by the morning of the 21st, it was central in northern Italy. During its passage, rain fell at stations in Switzerland and in Hungary. On the 22d, the storm-centre was in European Turkey, attended by light rains there and in Greece; during the day, the disturbance moved eastward and disappeared over the Black Sea.

XXVIII.—This depression appeared off the northern coast of Norway on the 21st, and moved, by a southeasterly course, across the peninsula. On the 22d, it was central over the Gulf of Bothnia, and, on the following day, it disappeared in Finland. During the passage of this depression, rain or snow, and slightly lower temperatures prevailed over the northern part of Scandinavia.

XXIX.—This is a continuation of the storms traced as low areas viii. and x. of this chart. On the 23d, the depression was central to the northwest of Ireland, the area of lowest pressure being enclosed by the isobar 29.20 (741.7); while a secondary depression existed over the North sea. Under the influence of these disturbances, heavy rains fell at nearly all stations in the British Isles, and on the eastern shores of the North sea, and brisk southwesterly winds prevailed over those districts. On the 24th, the disturbance was central over the North sea, the lowest pressure being reported at Fano, Jutland, where the barometer read 28.99 (736.3), wind s., force 4. The depression moved slowly northeastward, and on the 25th, was central off the southwestern coast of Sweden. On the 26th, it continued its northeasterly course and was central at the entrance to the Gulf of Bothnia. Rain and snow fell at stations north and east of the centre, but no decided change occurred in temperature. On the 27th, the disturbance was in Finland, where it finally disappeared.

XXX.—This is a continuation of low area xii., which originated over the Gulf of Mexico on the 18th. On the 27th, the disturbance was central near N. 50°, W. 15°; the s. s. "Scythia," in N. 51° 01′, W. 15° 23′, reporting barometer 29.12 (739.6), wind nne., force 6, raining, and the bark "Gem," in N. 48° 55′, W. 12° 55′, barometer 29.24 (742.7), wind wsw., force 5. During the 27th, the depression crossed England and moved toward the North sea, where it was central on the 28th. After the passage of the centre, the pressure still remained low over the British Isles, under the influence of low area xxxi., which had advanced from the southwest, during the night of the 28th.

XXXI.—This disturbance was central near the Bristol Channel on the morning of the 29th. The temperature rose at stations in the southern part of England and in northern France, and rain was general throughout the British Isles, except in the northern parts of Scotland and Ireland. The depression moved northeastward over the North sea, and by the 30th, it was central in southern Scandinavia. The heavy rain which fell during the passage of the disturbance, caused some damage by floods, at various places in England. On the 31st, the depression continued its northeasterly course and at close of the month, it was central in northern Sweden.

Of the storms appearing over Asia, the following are given:

XXXII.—This depression appeared on the 7th near Beirut, Syria. On that day, the barometer showed a fall of .15 inch, and the wind shifted from southeast to southwest. The disturbance probably moved northeastward and crossed the Caspian sea, as on the 29th, the depression was well-defined near Nukuss, Toorkistan. On the following day the disturbance disappeared.

XXXIII.—The disturbance passed over the island of Niphon on the 8th, on which date it was central near Tokei. The depression moved slowly northeastward, with decreasing pressure at the centre, and on the 9th, was central probably near N. 40°, E. 148°. The s. s. "City of Pekin," in N. 37° 19′, E. 147° 13′, reported barometer 29.13 (739.9), wind wnw., force 6, squally. On the 10th, the centre was near N. 41°, E. 153°, the area of lowest pressure being enclosed by the isobar of 29.00 (736.6); during the 11th, 12th and 13th, the depression moved apparently in a northeasterly direction, and disappeared on the last-mentioned date, near the Aleutian Islands. The track of the depression has been approximately located from reports of observations taken on board the s. s. "City of Pekin," which vessel was evidently under the influence of the disturbance from the 11th to the 13th.

XXXIV.—This disturbance appeared near Nikolaievsk, on the Amoor, on the 14th, and disappeared over the sea of Okhotsk on the 15th.

XXXV.—This was an area of relatively low-pressure which, from the 19th to the 23d, occupied the eastern coasts of Japan. During its presence, cloudy or partly cloudy and rainy weather prevailed along the coasts.

XXXVI.—This storm developed over the island of Niphon on the 27th. On that date, the barometer at Tokio, read 29.85 (758.3), showing a fall of .34 inch. On the 28th, the storm

moved into the Pacific, and was central near N. 37°, E. 154°, the s. s. "City of Tokio," in N. 32° 22′, E. 145° 07′, reporting barometer 29.88 (758.9), wind nw, force 7, cloudy. The following reports from the s. s. "Gaelic" indicate the presence of this depression in the Pacific ocean. On the 29th, in N. 44° 15′, E. 167° 05′, barometer 29.06 (738.1), wind wsw., force 5, clear; 30th, in N. 44° 32′, E. 173° 04′, barometer 28.96 (735.6), wind nw., force 5, raining; 31st, in N. 44° 47′, E. 179° 59′, barometer 28.87 (733.3), wind w., showery.

As a noteworthy feature in the atmospheric conditions over eastern Asia, may be mentioned the high pressures 30.20 (767.1) to 30.60 (777.2) that prevailed over the Chinese Empire from the interior to the coast, while areas of relatively low-pressure prevailed over Japan. Unusually low temperatures occurred in China; at Zi-Ka-Wei, near Shanghai, the minimum temperature of the month, 21.°2 Fahr., (—6°.0 Cent.), occurred on the 28th.

TEMPERATURE OF THE AIR.

The distribution of mean temperature, over the United States and Canada, for the month of November, 1882, is exhibited on chart ii., by the dotted isothermal lines. The table of comparative mean temperatures in the lower left-hand corner of the chart, shows the average temperature for the month in the several districts, as determined from observations taken at the Signal Service stations during the month of November in previous years.

Along the Atlantic coast, from New England to Florida, the mean temperature of the month is below the normal. In Florida, the departure is 2°.2; in the south Atlantic states, 1°.9, and in New England and the middle Atlantic states, less than 1°. In the northern and middle plateau districts, and on the Pacific coast, the temperature is also below the normal, the most marked departures occurring in the northern plateau and middle Pacific coast region, where they are 4°.4 and 3°.3, respectively. Throughout the remainder of the country the mean temperature is above the normal, the greatest departures occurring in the upper lake region, extreme northwest, the upper Mississippi and Missouri valleys, where the range is from 3°.7 to 4°.6. From the lower lake region southwestward to the Rio Grande valley, the departures vary from 1°.4 in the lower lake region, to 2°.8 in the Rio Grande valley.

DEVIATIONS FROM MEAN TEMPERATURE.

Under this heading, departures exhibited by the reports, from the regular Signal Service stations, are shown in the table of

Table of Comparative Minimum Temperatures for the Month of November.

State or Territory.	Minimum for November, 1882, Signal Service.		Lowest since Signal Service stations were opened—3 to 11 years.			Lowest from any other source.			
	Station	Temp.	Station.	Temp.	Year.	Place.	Temp.	Year.	Length of Record.
		°		°			°		
Alabama	Montgomery	29	Montgomery	25	1881	Huntsville	13		9 years.
Arizona	Fort Apache	13	Prescott	— 1	1881	Whipple Barracks	— 1		9 "
Arkansas	Fort Smith	22	Little Rock	10	1880	Fort Smith	6		21 "
California	Red Bluff	29	Campo	16	1881	Fort Bidwell	9		11 "
Do						Summit	1		
Colorado	Pike's Peak	—26	Pike's Peak	—36	1880	Fort Garland	—35		30 "
Do	West Las Animas	— 1							
Connecticut	New Haven	16	New Haven	2	1875	New Haven	2		87 "
Dakota	Fort Buford	— 3	Pembina	—40	1874	Fort Buford	—37		16 "
Delaware	Delaware Breakwater	29	Delaware Breakwater	23	1880	Delaware City	13		4 "
Dist. of Columbia	Washington	24	Washington	12	1880	Washington	12		49 "
Florida	Pensacola	30	Saint Marks	27	1877	Fort Barrancas	19		59 "
Georgia	Atlanta	29	Atlanta	20	1881	Atlanta	10		7 "
Idaho	Eagle Rock	—14	Eagle Rock	— 1	1881	Fort Hall	—12		4 "
Illinois	Champaign	15	Champaign	— 3	1880	Augusta	—12		19 "
Indiana	Indianapolis	22	Indianapolis	— 5	1880	Indianapolis	4		18 "
Indian Territory	Fort Supply	9	Fort Gibson	—10	1880	Fort Gibson	0		52 "
Iowa	Davenport	13	Dubuque	— 9	1875	Independence	—17		18 "
Kansas	Dodge City	7	Dodge City	— 7	1880	Fort Leavenworth	—14		51 "
Kentucky	Louisville	29	Louisville	8	1880	Newport Barracks	—23		30 "
Louisiana	Shreveport	29	Shreveport	18	1880	Fort Jessup	17		23 "
Maine	Eastport	20	Eastport	—13	1875	Orono	—16		13 "
Do						Brunswick	— 3		53 "
Maryland	Baltimore	26	Baltimore	15	1880	Emmittsburg	7		12 "
Massachusetts	Springfield	16	Boston	— 2	1875	Florida	—14		4 "
Michigan	Port Huron	10	Marquette and Escanaba	— 9	'79-'80	Fort Brady	—17		59 "
Minnesota	Moorhead	— 7	Duluth	—29	1875	Fort Ripley	—30		17 "
Mississippi	Starkville	29	Vicksburg	23	'77&'80	Columbus	22		10 "
Missouri	Springfield	20	Saint Louis	8	1880	North Springfield	— 9		1 "
Do						Allentown	— 5		4 "
Do						Jefferson Barracks	— 2		35 "
Montana	Terry's Landing	—15	Fort Benton	—31	1875	Camp Baker	—42		9 "
Nebraska	North Platte	5	North Platte	—10	1877	Camp Sheridan	—17		6 "
Nevada	Ploche	6	Winnemucca	— 9	1880	Camp Halleck	—12		11 "
New Hampshire	Mount Washington	— 7	Mount Washington	—40	1877	Grafton	—16		2 "
Do						Dartmouth College	— 9		18 "
New Jersey	Atlantic City	21	Atlantic City	10	1875	North Germantown	6		2 "
Do						Newark	8		38 "
New Mexico	Santa Fé	6	Santa Fé	—11	1880	Fort Union	—15		31 "
New York	Buffalo	17	Albany	—10	1875	Canton	—20		2 "
Do	Rochester	17				Gouverneur	—17		40 "
North Carolina	Charlotte	28	Charlotte	18	1880	Fort Johnston	9		54 "
Ohio	Sandusky	19	Columbus	— 5	1880	Westville	—13		9 "
Do						College Hill	— 2		68 "
Oregon	Umatilla	15	Umatilla	9	1880	Camp Harney	4		12 "
Do						Fort Dalles	4		16 "
Pennsylvania	Williamsport	14	Pittsburg	4	1880	Franklin	— 8		8 "
Do						Philadelphia	12		113 "
Do						Alleghany Arsenal	4		31 "
Rhode Island	Point Judith	15	Newport	4	1875	Fort Adams	3		42 "
Do	Narragansett Pier	15							
South Carolina	Charleston	36	Charleston	28	1881	Aiken	23		8 "
Do						Charleston	28		105 "
Tennessee	Knoxville	27	Knoxville	15	'80 & '81	Clarksville	— 3		8 "
Texas	Fort Elliott	14	Fort Elliott	— 5	1880	Fort Elliott	— 8		3 "
Do						Fort Richardson	8		10 "
Utah	Salt Lake City	7	Salt Lake City	3	1880	Coalville	—18		9 "
Vermont	Burlington	17	Burlington	—10	1875	Newport	—18		9 "
Virginia	Lynchburg	27	Lynchburg	13	1880	Snowville	9		8 "
Do						Fort Monroe	15		58 "
Washington	Colfax	10	Spokane Falls	3	1881	Fort Colville	— 8		20 "
West Virginia	Morgantown	25	Morgantown	8	1880	Helvetia	0		4 "
Wisconsin	La Crosse	16	Milwaukee	—14	1875	Neillsville	—26		8 "
Do						Fort Crawford	—13		25 "
Wyoming	Fort Washakie	—23	Cheyenne	—20	1875	Fort Bridge	—40		24 "